

Sub E1 **I Claim:**

1. In a batch liquid purifier having a generator outputting an ozone-containing gas merged during a purification operation with liquid flowing in a passageway from a liquid batch container to a purified liquid dispenser, an improvement comprising:

- a. admission of untreated liquid to the passageway being blocked when the purifier is not operating;
- b. a pumping system that operates when the purifier is operating to admit untreated liquid to the passageway, to flow liquid through the passageway, and to mix the ozone-containing gas with the liquid flowing in the passageway to dissolve the ozone in the liquid;
- c. the liquid passageway downstream and adjacent to the mixing of the ozone-containing gas with the liquid being formed as an upflow chamber in which bubbles of the ozone-containing gas rise within and to the level of an initial flow of liquid rising in the upflow chamber at the beginning of a purification cycle; and
- d. the liquid flow passageway downstream of the upflow chamber being configured to ensure sufficient contact between ozone and the liquid to purify the liquid before it reaches the dispenser.

⁴⁰ 2. The improvement of claim ³⁹ 1 including a light-transmitting wall of the upflow chamber making bubbles visible as they rise within the chamber.

⁴¹ 3. The improvement of claim ⁴⁰ 2 including an illuminator arranged for enhancing the visibility of the rising bubbles.

⁴² 4. The improvement of claim ⁴⁰ 2 wherein the light-transmitting wall is colored.

⁴³ 5. The improvement of claim ³⁹ 1 wherein the generator operates before liquid flows in the passageway.

⁴⁴~~8~~. The improvement of claim ¹ including a filter for the liquid being dispensed and an indicator showing a need to change the filter.

⁴⁵~~1~~. The improvement of claim ⁴⁴~~8~~ wherein the indicator is responsive to an extent of operation of the purifier.

⁴⁶~~8~~. The improvement of claim ³⁹~~1~~ including a mixer in the liquid passageway.

⁴⁷~~8~~. The improvement of claim ⁴⁶~~8~~ including a mixer upstream of the upflow chamber and a mixer downstream of the upflow chamber.

⁴⁸~~10~~. The improvement of claim ³⁹~~1~~ including a constriction in an air flow through the generator enabling the pumping system to draw liquid from the container.

⁴⁹~~11~~. The improvement of claim ³⁹~~1~~ including a pump protector arranged for stopping liquid pumping after the container is empty.

⁵⁰~~12~~. The improvement of claim ³⁹~~1~~ including an air pump connected to the liquid passageway and arranged to help empty the liquid passageway of liquid after a purification cycle.

⁵¹~~18~~. The improvement of claim ⁵⁰~~12~~ including a liquid sensing system arranged to control the air pump.

⁵²~~14~~. The improvement of claim ³⁹~~1~~ wherein the liquid dispenser includes a movable spout that can be extended beyond a housing of the purifier.

⁵³~~18~~. The improvement of claim ⁵²~~14~~ wherein extending the spout activates the purifier and retracting the spout deactivates the purifier.

⁵⁴~~18~~. The improvement of claim ⁵²~~14~~ including a switch that blocks dispensing unless the spout is extended.

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~~37~~. The method of claim ~~36~~ including blocking liquid flow unless the dispensing outlet is extended.

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~~38~~. The method of claim ~~37~~ including making a container for untreated liquid detachable from a purifier of the liquid.

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~~39~~. A liquid purifier combining an unpurified liquid batch container, a liquid flow passageway leading from the container to a purified liquid outlet, a generator producing an ozone-containing gas, and a pumping system flowing the liquid through the passageway and combining the ozone-containing gas with the liquid to purify the liquid en route to a dispensing outlet, the purifier comprising:

- a. the liquid passageway downstream of a region where the ozone-containing gas joins the liquid being formed into an upflow chamber in which a leading flow of the liquid rises at a rate exceeded by a rate of rise of bubbles of the ozone-containing gas within the liquid so that the ozone-containing gas overtakes the leading liquid flow; and
- b. the liquid passageway includes ozone and liquid mixing and a liquid flow configuration that ensures purifying contact of the liquid with ozone before the liquid reaches the dispensing outlet.

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~~40~~. The purifier of claim ~~39~~ wherein a wall of the upflow chamber transmits light and makes the rising bubbles visible.

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~~41~~. The purifier of claim ~~40~~ including an illuminator enhancing the visibility of the rising bubbles.

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~~42~~. The purifier of claim ~~40~~ wherein the light-transmitting wall of the upflow chamber is colored.

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~~43~~. The purifier of claim ~~39~~ including a barrier to entry of the liquid into the passageway before the pumping system operates.

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~~44~~. The purifier of claim ~~39~~ wherein the ozone generator operates before liquid flows in the passageway.

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~~46~~. The purifier of claim ~~30~~¹⁶¹⁹ including a mixer upstream of the upflow chamber.

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~~46~~. The purifier of claim ~~30~~¹⁹ including a constriction in a flow of air through the generator enabling the pumping system to
5 draw liquid from the container.

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~~47~~. The purifier of claim ~~39~~¹⁹ including a pump controller arranged for stopping a liquid pump after liquid stops flowing to the pump.

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~~48~~. The purifier of claim ~~39~~¹⁹ including an air pump connected
10 to the liquid passageway and arranged to help empty the liquid passageway of liquid after a purification cycle.

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~~49~~. The purifier of claim ~~48~~²⁸ including an air pump controlling system responsive to liquid in the passageway for turning the air pump on and off.

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15 ~~50~~. The purifier of claim ~~39~~¹⁹ wherein the dispensing outlet is closed when purified liquid is not being dispensed.

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~~51~~. The purifier of claim ~~39~~¹⁹ wherein the dispensing outlet includes a movable spout that can be extended beyond a housing of the purifier.

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20 ~~52~~. The purifier of claim ~~51~~³¹ wherein liquid flow is blocked unless the spout is extended.

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~~53~~. The purifier of claim ~~51~~³¹ including a system for starting and stopping the purifier respectively in response to extension and retraction of the dispensing outlet.

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25 ~~54~~. The purifier of claim ~~30~~¹⁹ including a gas-liquid separator arranged in the liquid passageway downstream of the upflow chamber.

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~~55~~. The purifier of claim ~~39~~¹⁹ including a mixer downstream of the upflow chamber.

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~~50~~. The purifier of claim ~~49~~ including a valve upstream of a desiccant in an air inlet to the generator for preventing moist air from entering the desiccant except when air is drawn into the generator during operation.

- 5 ³⁷~~51~~. The purifier of claim ¹⁹~~39~~ wherein the container is detachable from the purifier.

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